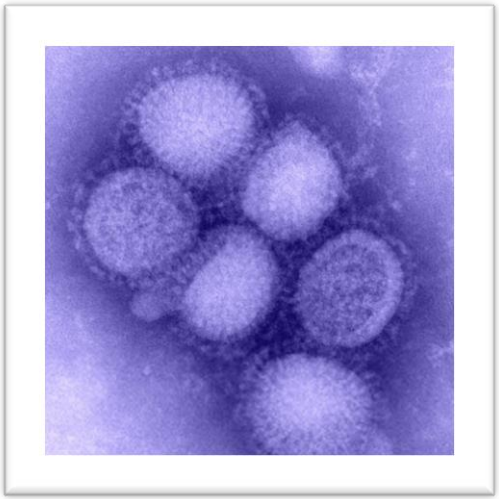
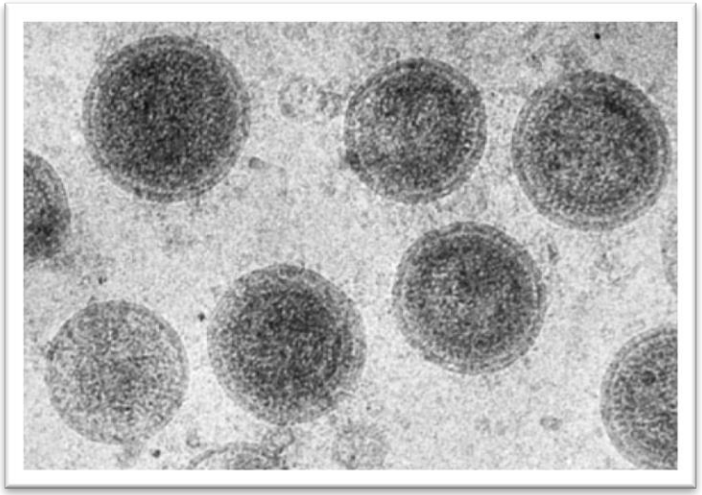
Infectious Diseases and Single-Cell Organisms

Obj. 3.c. & 3.g.





Infectious Diseases

Do Now

What is a disease? Name 3 diseases that you have heard of.

Student Learning objectives

3.c - Describe how viruses, bacteria, fungi, and parasites may infect the human body and interfere with normal body functions. (DOK 1)

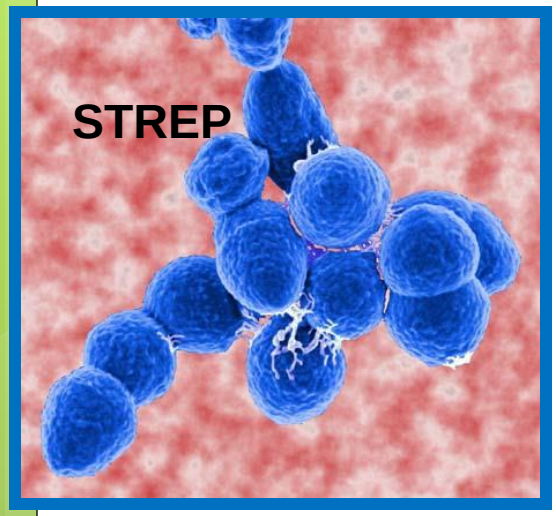
Diseases Caused By Cells

- A disease is a condition that stops the body from functioning normally.
- Non-infectious diseases are not spread from person to person and may be chronic (long-lasting).
  - Ex. Allergies, diabetes, cancer
- Infectious diseases are caused by a microorganism that is transmitted or spread from one organism to another.
  - A pathogen is any microorganism that causes a disease.

Pathogens

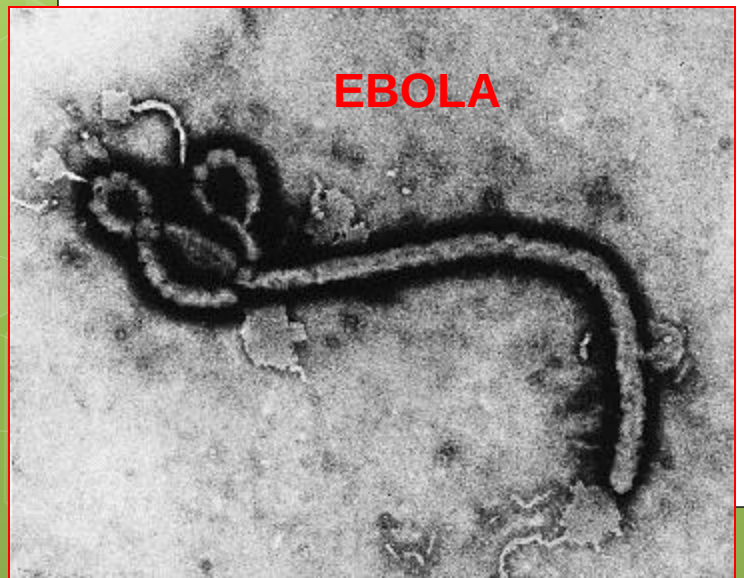
There are four types of pathogens that infect the human body.

- Viruses
- Bacteria
- Protists
- Fungi


STREP


H1N1


ATHLETE'S
FOOT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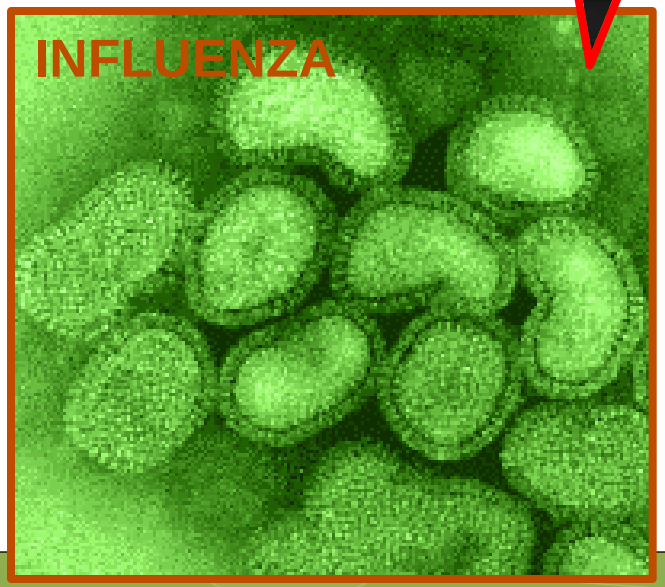
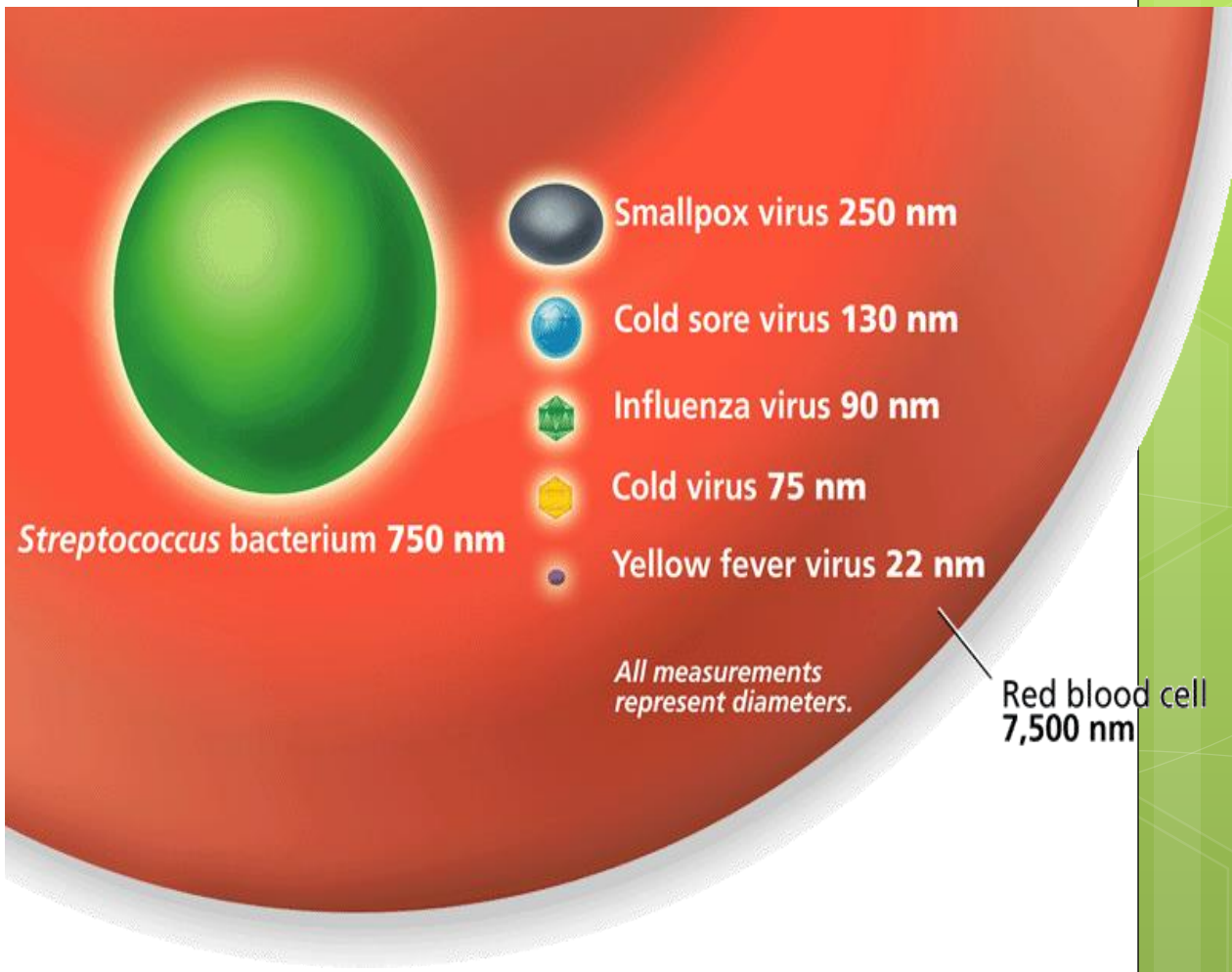

INFLUENZA

Virus

- A tiny non-living particle made of nucleic acid (genetic material) covered with a protein coating that can only reproduce inside of a living cell (host)
  - The host provides the energy for the virus.
  - The virus acts like a parasite because it eventually destroys the cell and then infects other cells.

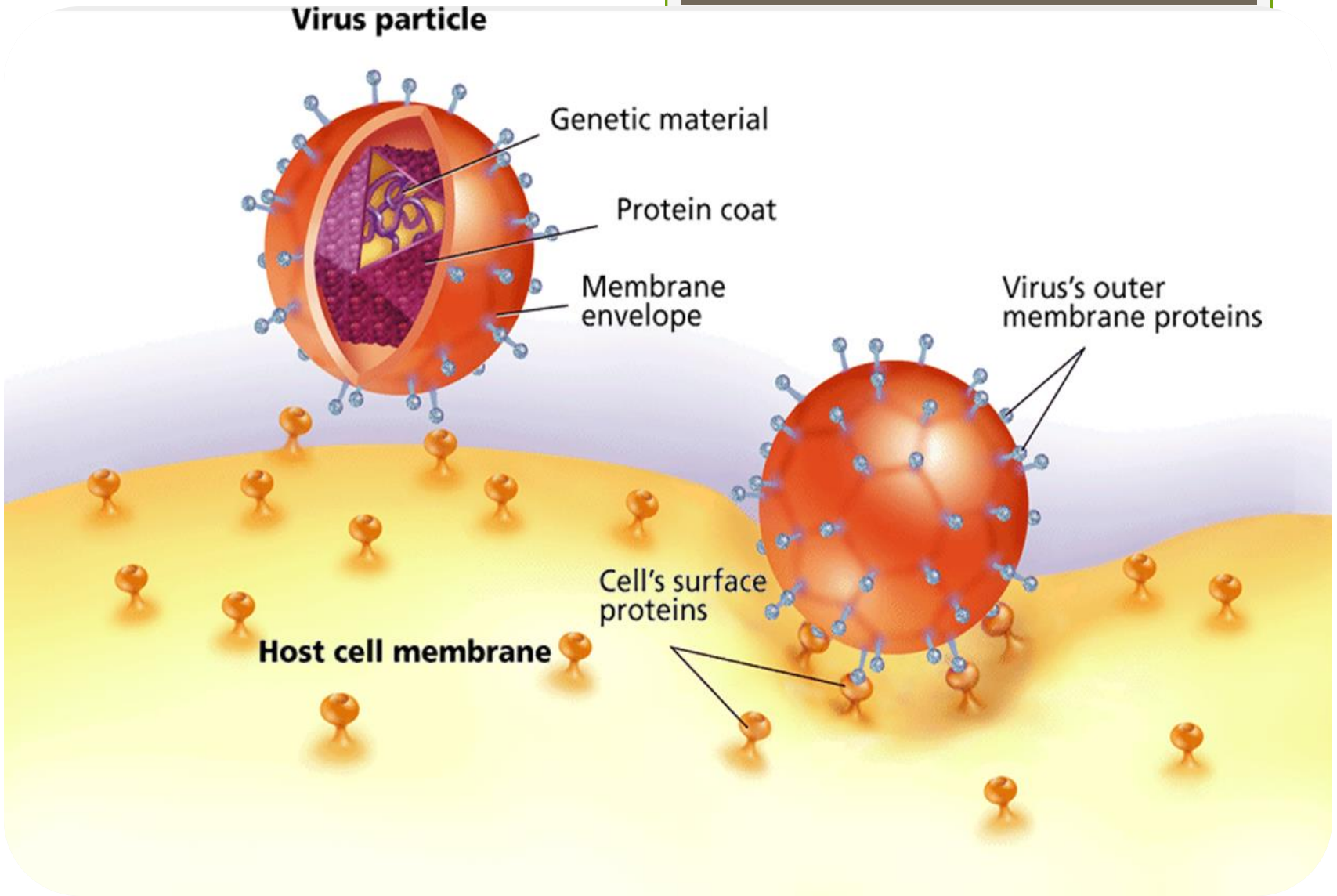
Types of Viruses

- Common Cold
- HIV
- Polio
- Smallpox
- Chickenpox
- Yellow fever
- Measles
- Ebola
- Influenza (Flu)



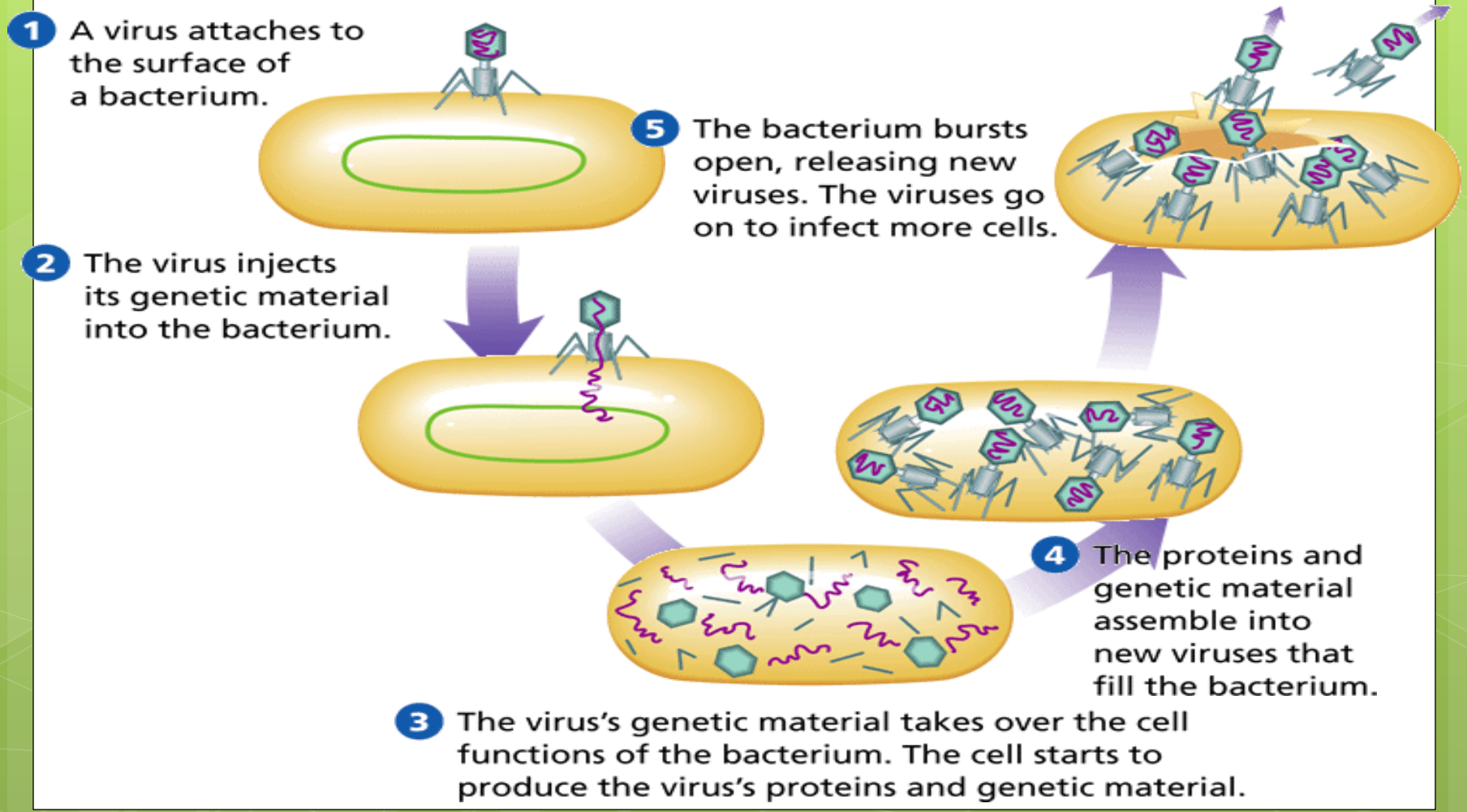
Do Now

Name the four types of pathogens that infect human body. Give examples of four viral diseases.


Virus particle
Genetic material
Protein coat
Membrane envelope
Virus's outer membrane proteins
Cell's surface proteins
Host cell membrane

How Does a Virus Multiply?

- Active viruses enter cells and immediately begin to multiply, leading to the quick death of the invaded cells.

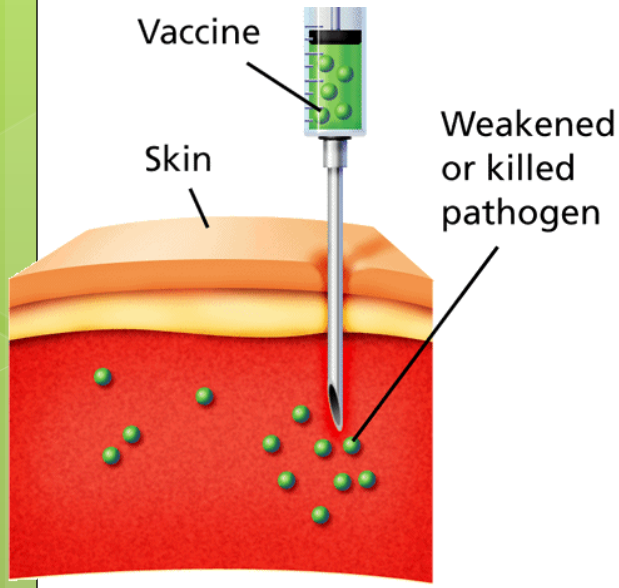


Treatment of Viruses

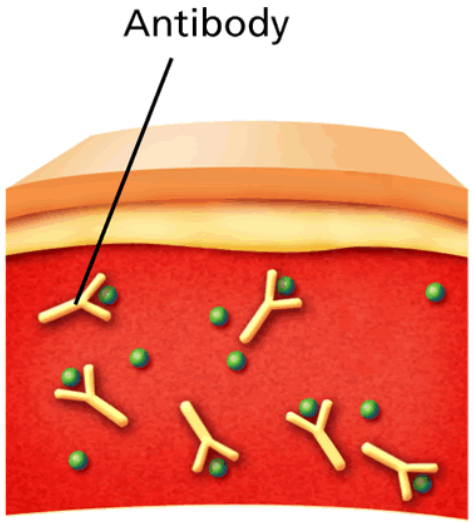
- Antibiotics are not effective against viruses.
- Vaccines are used against most viruses that are treatable.
- A vaccine is a small dose of the weakened or inactive form of the virus that allows the immune system to fight the disease by creating antibodies that can recognize and destroy the pathogen if you come in contact with it.
- Many viruses have no cure.

Video

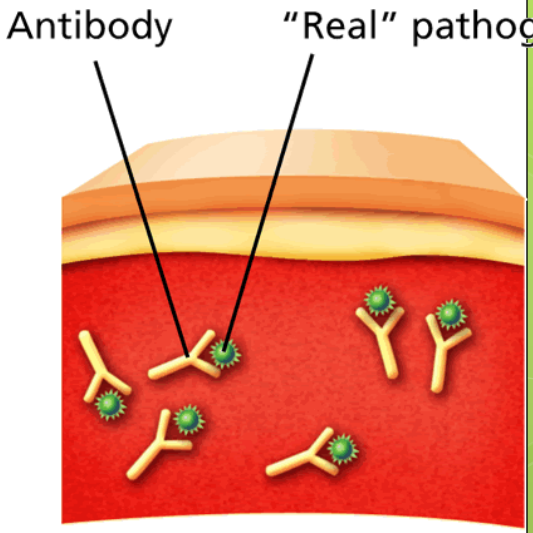
How Vaccines Work



1 A person receives an injection with weakened or killed pathogens.

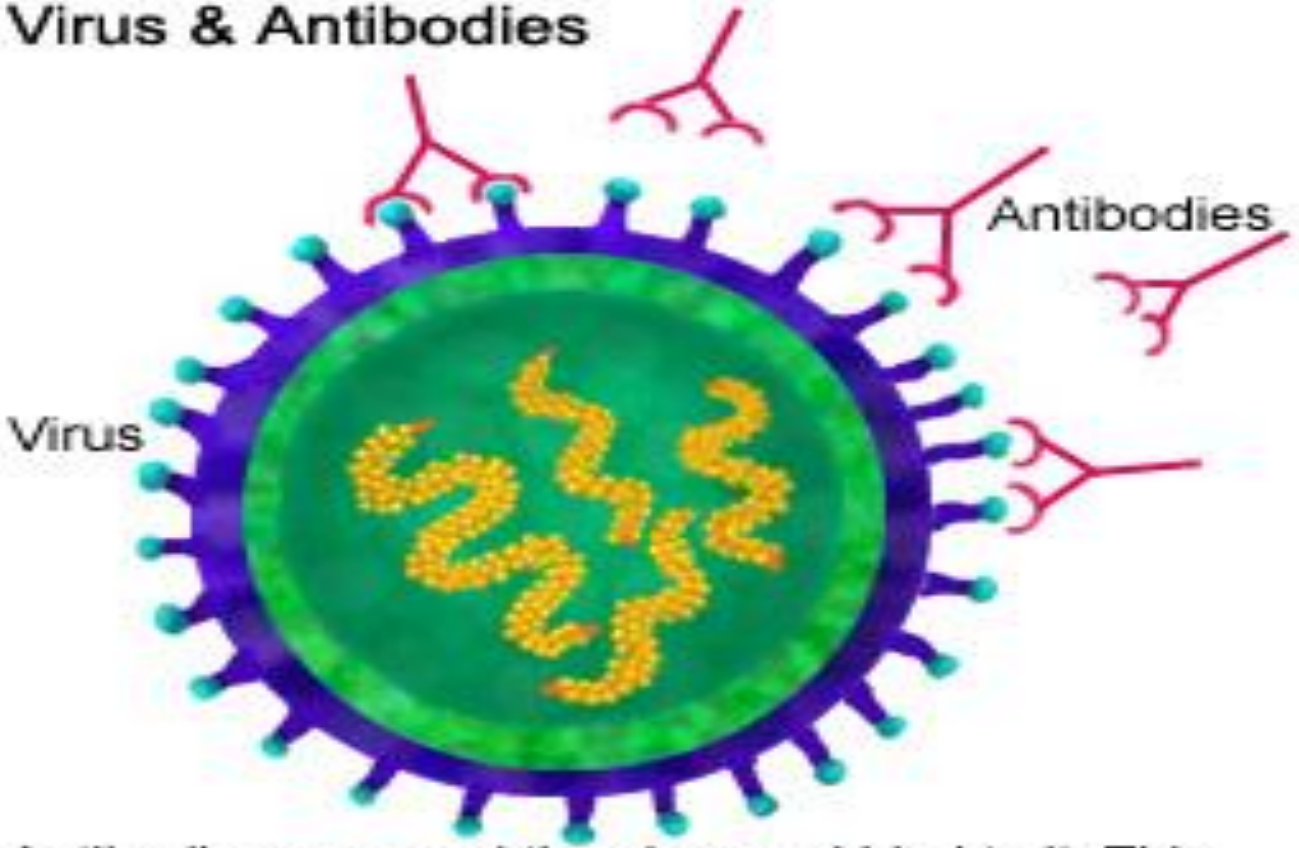


2 The immune system produces antibodies against the disease. It also produces memory cells.



3 If the "real" pathogen invades later, memory cells help to produce antibodies that disable the pathogen.

Virus & Antibodies



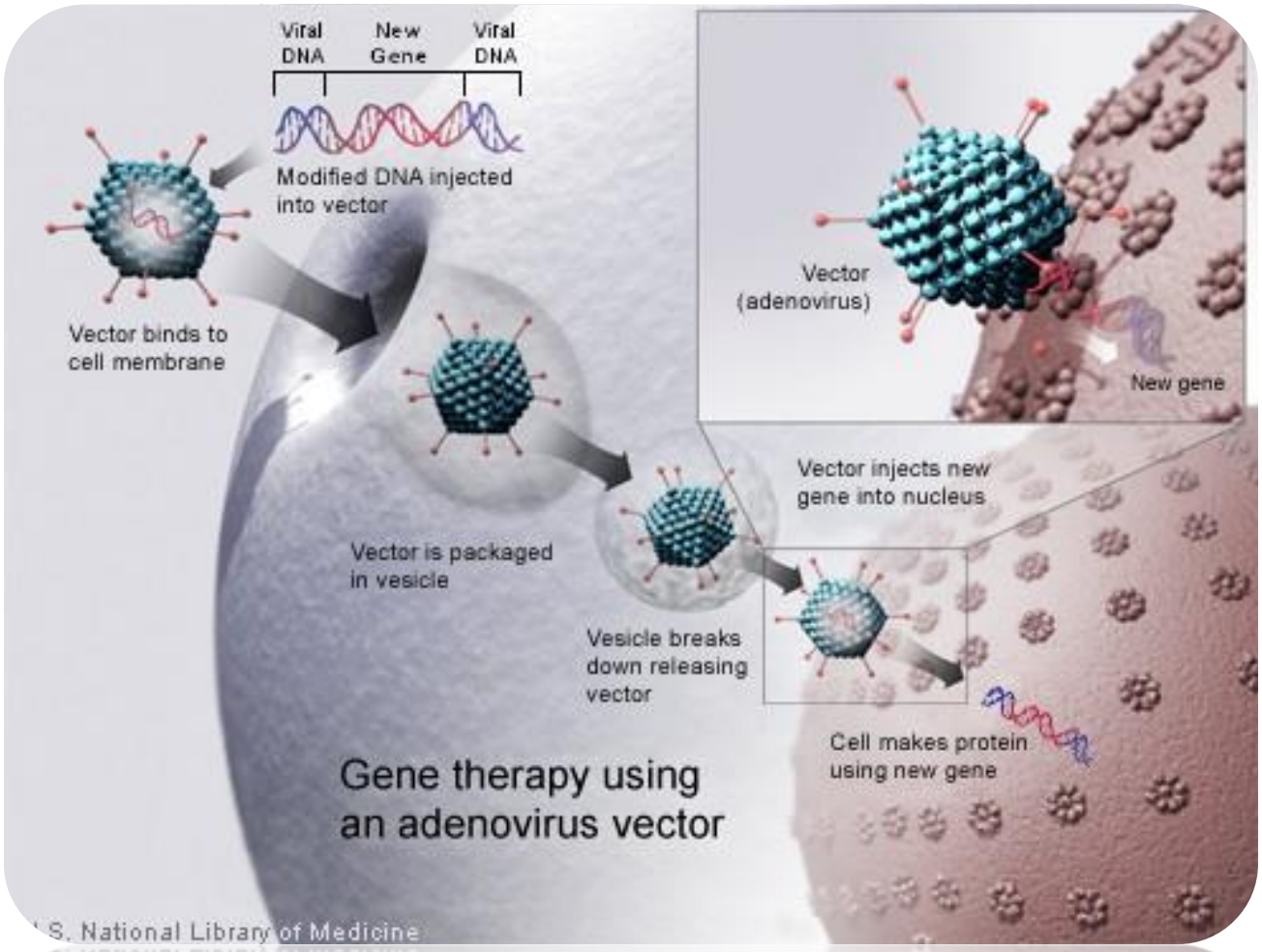
Antibodies surround the virus and bind to it. This prevents the virus from reproducing or being transported throughout the body.

(c) 2006 Duplication not permitted

Gene Therapy with Viruses

- Scientists are studying ways to use viruses as messengers to alter the DNA of cells that carry genetic disorders by taking advantage of their ability to enter a host cell.

Gene Therapy



Additional video

Common Viral Diseases

- Unlike with bacterial diseases, there are currently no medications that can cure viral infections.

CHICKENPOX

Symptoms:	Fever; red, itchy rash
How It Spreads:	Contact with the rash; inhaling droplets
Treatment:	Antiviral drug (for adults)
Prevention:	Vaccine

What did you notice what similar among each viral disease?

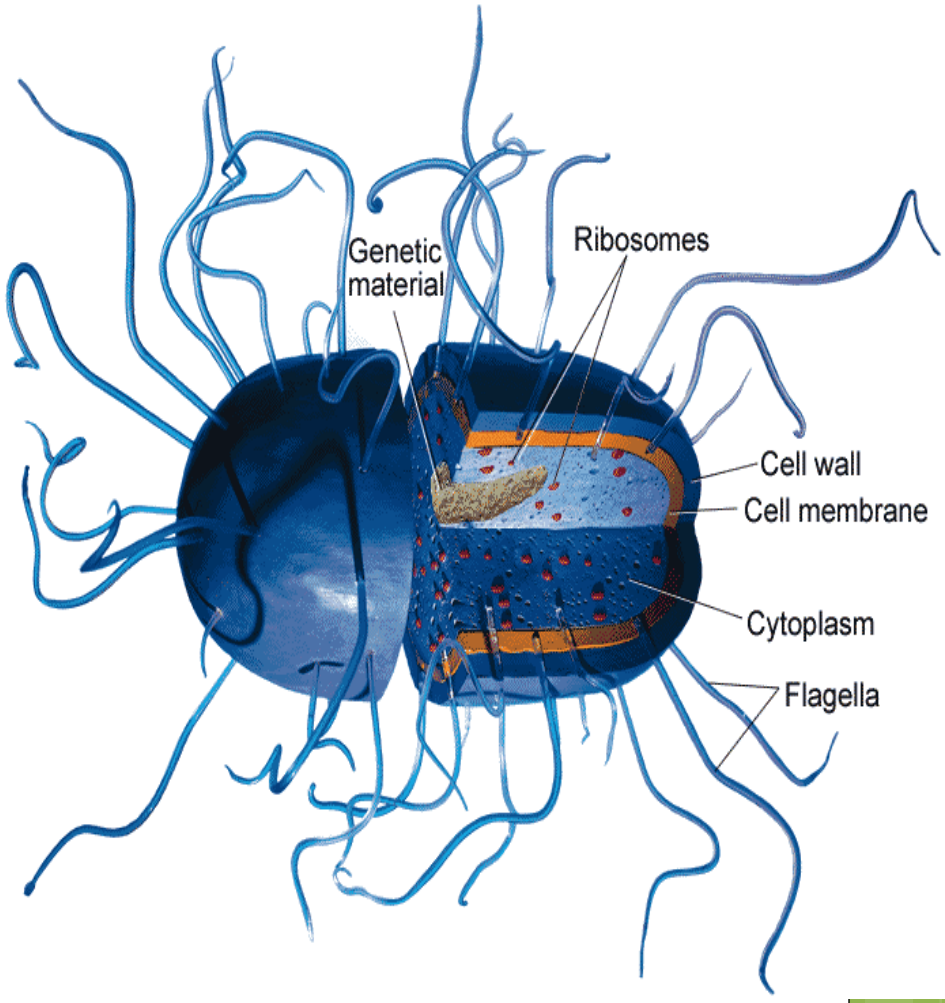
Pathogens

There are four types of pathogens that infect the human body.

- Viruses
- Bacteria
- Protists
- Fungi

Bacteria

- Bacteria are prokaryotic cells which are cells that lack a nucleus and other organelles.
- Slow down normal growth and activity of body cells & can produce toxins that kill cells on contact.
- Flagella helps the with movement.
- Have a cell wall.
- Reproduce quickly by binary fission.



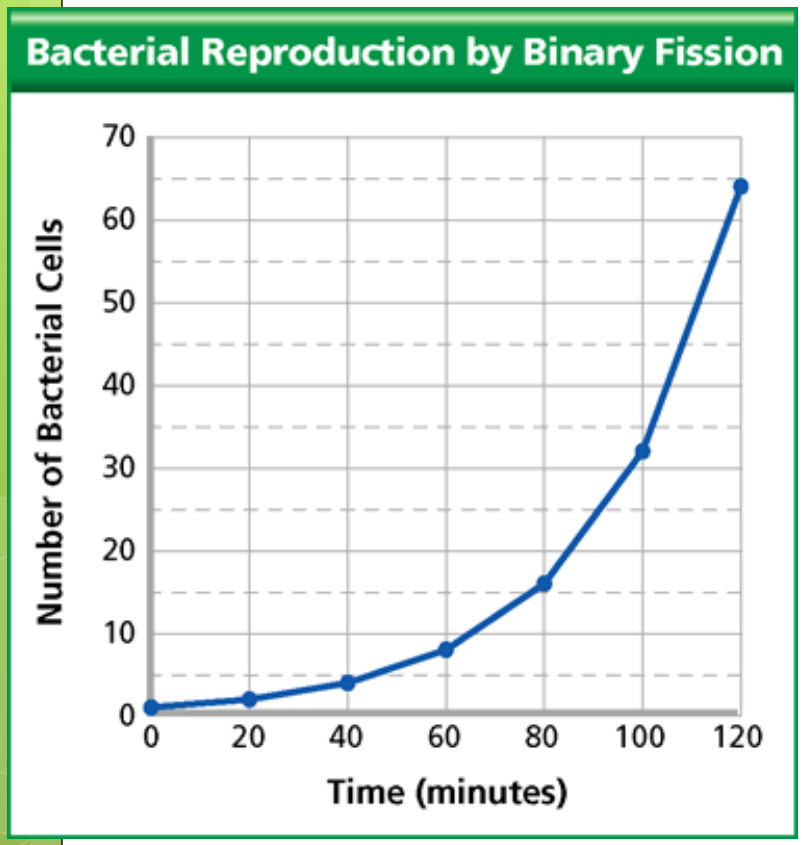
Video

- http://www.cellsalive.com/strep.htm

Types of Bacteria and Symptoms

- Lyme disease: tick bite with rash, fever, & aches
- Tetanus: muscle spasms, paralysis, death
- Tuberculosis: cough, fever, fatigue, death
- Pneumonia: fluid build up in lungs
- Strep Throat: sore throat, swollen glands, fever
- Salmonella: vomiting, fever, death
- Ear infection
- Conjunctivitis- itchy, red eyes

Bacteria Population Explosion



- Suppose a bacterium reproduces by binary fission every 20 minutes
- The new cells survive and reproduce at the same rate.
- After 16 hours two cells could become 8.5 billion

Common Bacterial Diseases

- Many bacterial diseases can be cured with antibiotics.
- Antibiotics are substances that slow or kill bacteria.

FOOD POISONING

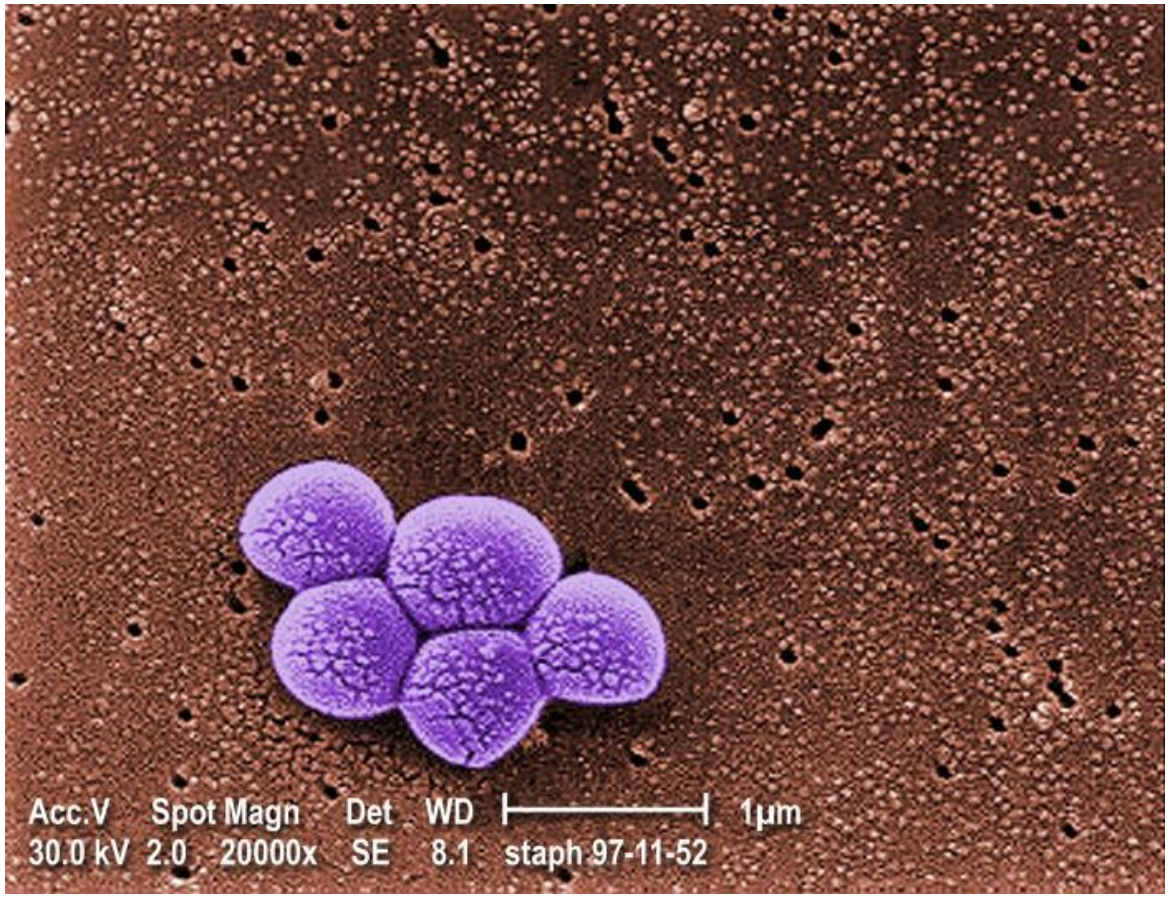
Symptoms:	Vomiting; cramps; diarrhea; fever
How It Spreads:	Eating foods containing the bacteria
Treatment:	Antitoxin medicines
Prevention:	Properly cook and store foods; avoid foods in rusted and swollen cans.

What did you notice what similar among each viral disease?

Antibiotic Resistance

- Over the years, the misuse & increased usage of antibiotics has allowed some antibiotics to become resistant to their effects.
- The bacteria that is resistant survives & passes its genetic information on to the next generation.
- This makes it difficult to treat some bacterial diseases and has caused an increase in some diseases due to lack of effectiveness.

MRSA, a resistant bacteria



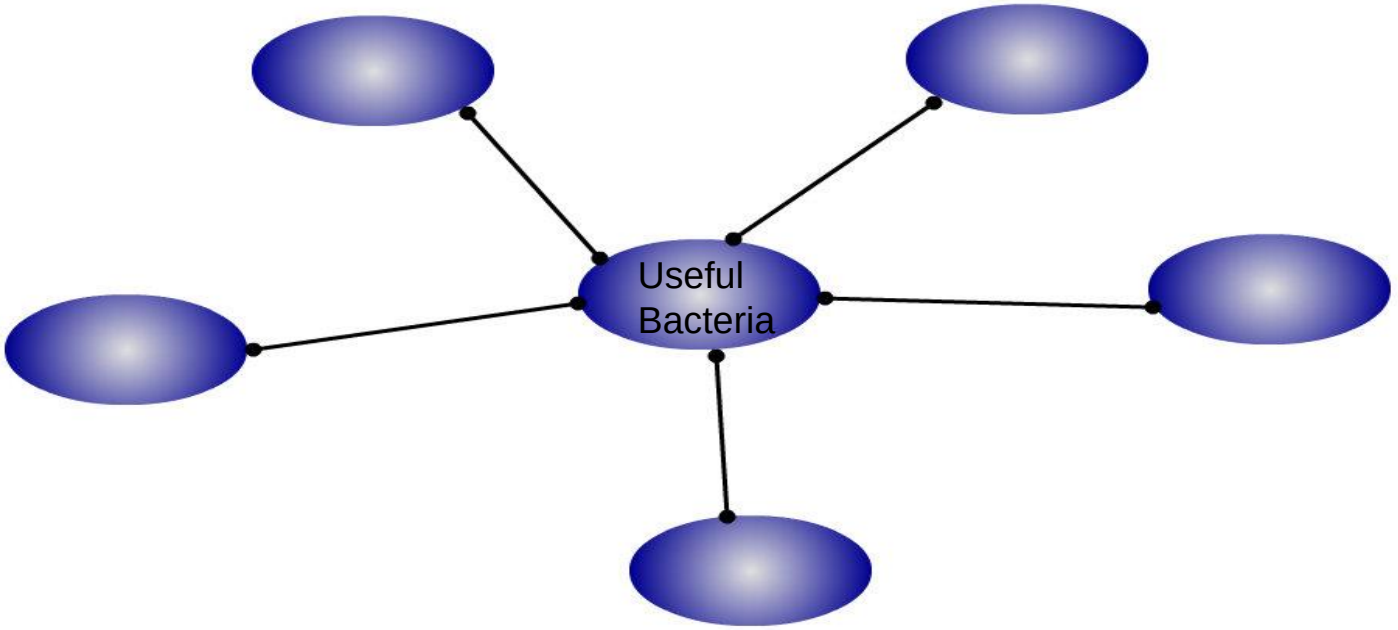
Benefits of Bacteria

- Most Bacteria is either harmless or helpful to humans.
- Ways people depend on bacteria
  - Food production: feeds on sugars in milk during cellular respiration to aid in the production of yogurt & cheese.
  - Environmental recycling & clean-up: produces oxygen for the atmosphere, break down dead organisms, and can aid in oil-spill clean-up.
  - Health maintenance: helps digestive tract break down foods & produce necessary vitamins.
  - Medicine production: help produce insulin for diabetics.

Video

Exit slip

How are bacteria useful to us? Draw a concept map as is show in the slide below and write your answers in the bubbles..

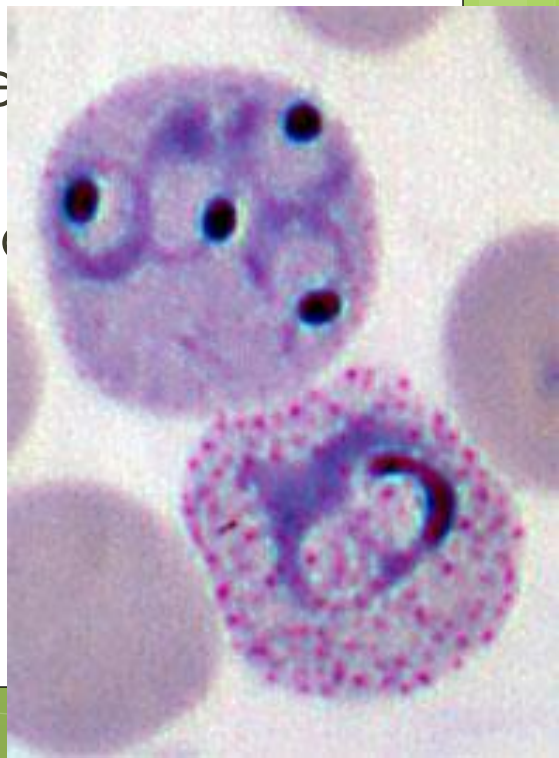


Protists

- Protists are single-celled eukaryotic organisms.
- They can destroy tissue, blood cells, or interfere with normal body functions.
- Some can be fatal when not treated quickly.

Types of Protists

- Malaria: transferred to human blood from the biological vector mosquito.
- Amoebic Dysentery: acquired from contaminated food or water or untreated sewage
- Sleeping Sickness: transferred by tsetse one host to another such as a cow
- Treatment of these diseases depends infection.



Parasites

- **Parasitism** occurs when one organism (**parasite**) lives on or inside another organism (**host**).
- The parasite does not immediately kill the host.
- Why would a parasite try to keep its host alive?

Parasitism

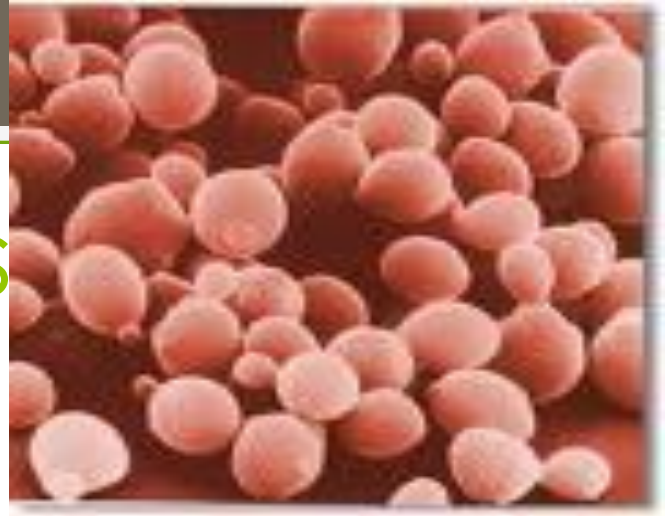
Human Parasites
The Parasite Picture Gallery

Fungus

- Most fungi that infect the body are unicellular organisms.
  - Examples: yeast, molds, & mildew
- Fungi can infect the skin with a rash, irritate lungs, inflame the heart, bones, and the brain.
- Fungi are treated with anti-fungal creams or medications.
- Examples: athletes' foot & ringworm
- Some fungi are used in the production of medicines.
  - Penicillin is an antibiotic used to treat bacteria infections.

Fungal Infections

Beneficial Uses Yeast



- Yeast is a unicellular organism that is used to bake bread products & some alcohols.
- Fermentation is the process in which yeast makes energy by converting sugar into alcohol & carbon dioxide.
- The trapped carbon-dioxide causes the dough to rise and the alcohol to evaporate in the warm temperatures.

Pathogens & Your Health: How they Spread

- Pathogens can spread through contact with an infected person; soil, food, or water; a contaminated object; or an infected animal
  - An animal or organism that carries a disease that can be passed to humans is called a biological vector.
  - Examples of Vectors:
    - rats: black plague
    - birds: West Nile virus
    - mosquitos: malaria
    - dogs: rabies
    - ticks: Lyme disease

vectors

- Each person in the group will get a card
- Starting with the person whose birthday is earliest in the year, read the clues (not the answer).
- Others will write down what type of disease you are describing.

Ways to Prevent the Spread of Diseases

- 1. Wash hands and wounds with soap and water.

Ways to Prevent the Spread of Diseases

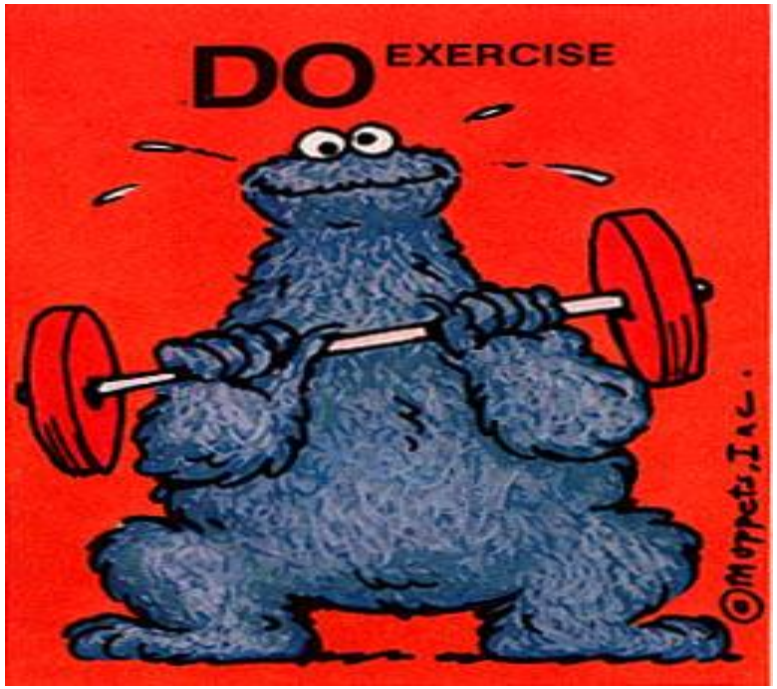
- 2. Brush your teeth everyday.

Ways to Prevent the Spread of Diseases

- 3. Get enough rest and eat well-balanced meals.

Ways to Prevent the Spread of Diseases

- 4. Exercise.



Ways to Prevent the Spread of Diseases

- Get an annual checkup.

Video

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